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A Strategy Model on the Perspective of GVC and NVC

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Abstract
This paper gives a brief conclusion of the pros and cons for developing countries emerging GVC. Many producers in developing countries find it difficult to get upgrading, oppositely, turn out to remain in the low-end of the value chain. Based on the bad sides concluded, possible solution is introduced for developing countries getting out of such dilemma. This paper introduces a new kind of value chain: NVC; and build a value chain strategy model to help developing countries making strategies when involved in value chains.

Key words: Global value chain; National value chain; Strategy model

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INTRODUCTION
In the last decades globalization has been characterized by falling barriers on international trade due to the decrease of tariffs and lowering of price support and export subsidies, the emergence of global value chains and increasing concentration and consolidation in various links of these chains. These developments have turned many multinational companies (MNCs) into global players in the sourcing and distribution of products and have at the same time resulted in the emergence of new players in the national markets of many developing countries. However, unequal power relationships in these chains and trade barriers impact on the distribution of costs and benefits over the chain participants, keeping the high value-adding activities in Western countries. Under such situation, whether it is a good choice for developing countries emerging GVC?

GVC analysis originates from the commodity chain approach (Gereffi, 1994). The focus is on governance and upgrading opportunities in developing country value chains. Fleury (2001) shows how the transfer of technology and standards led to changing structures and upgrading of the plastics industry in Brazil. Bair and Gereffi (2003) show developments in the apparel industry in Mexico, where industry upgraded from mere manufacturing to R&D and design. It can also be an important mechanism for developing countries to enhance productive capacity, by increasing the rate of adoption of technology and through workforce skill development, thus building the foundations for long-term industrial upgrading.

Although inclusion in global value chains often brings a larger share of value added to DC producers, prices in Western markets do not automatically translate into prices for DC suppliers. As Fitter and Kaplinsky (2001) show, increasing differentiation of coffee prices at the retail or specialty shop outlets do not translate in increasing variance in prices paid at the farm gate. Transaction cost is also one of the key concerns in the GVC researches because of its close relationship with GVC governance. According to Williamson (1995, 1999) joint investments, the ability to measure the agent's performance and uncertainty are deciding factors for the costs of transactions; if transaction costs are low, actors will favor

market governance. In the respect of business, developing country may face many uncertainties caused by poor physical infrastructures, weak institutional infrastructures, unbalanced trade relationships and unfavorable social and political conditions, leading to uncertainties and risks for developing country producers, which makes monitoring of transactions difficult given by David and Han (2004). Jahn et al. (2004) firms that for producers to get access to modern retail markets, certification according to these standards is conditional. However, Dolan and Humphrey (2000) states that because of these standards access to these markets for small and medium-size producers is difficult and in many cases impossible[8]. Branding and labeling of specialty products by developing country producers is constrained by Western (super) markets, due to the private-label policy of many supermarket chains. Gwyne (2008) shows that Tesco's private label of Chilean wine (Tesco Finest) covers more than 50% of wine sales in its shops. Van der Spiegel (2004) points out that to achieve efficient and competitive production in value chains, management of "seamless" product and information flows are of key importance; which is challenging for developing country producers because of lacking or nonfunctioning infrastructures. A large part of GVC value added in developing economies is generated by affiliates of TNCs. This raises concerns that value can be leaked. It is also difficult for developing countries to jump from the low-end. Finally the endogenous risk is a general problem occurring in developing countries.

1. DIFFICULTY IN JUMPING FROM THE LOW-END

Many producers in developing countries find it difficult to get upgrading, oppositely, turn out to remain in the low-end of the value chain.

The value chain of multinational enterprises implies that developed countries firmly occupy the ends of high added value in the value chain, and control the upgrading activity of the low value-added manufacturing sectors of the developing countries. So it is difficult for developing countries to jump from the low-end of the Smile Curve (the manufacturing aspects) to the high-end of the Smile Curve which added value is higher (the research and sales aspects). This can result from a number of factors: Firstly, big buyers of developed countries and multinational enterprise control the core part of the value chain with the confidential technologies. Besides, big buyers and MNEs design various standards including technology, quality, delivery, environment protecting, price etc. as entry barriers. What's more, the particular junior factor endowment of the developing country determines the low cost manufacturing; and such producers can be replaced. Other exogenous reasons include: prevailing business practices of leading firms, global competitive dynamics of value chains and the routines of contractors involved in the value chain.

The endogenous risk of producers in developing countries is also an important cause that remains themselves in the low-end of the value chain. The endogenous risk of industrial clusters in developing countries is the lack of innovation power; self locked in low value-added sectors, too much emphasis on external relevance and ignore the internal network construction industrial cluster etc..

The developing countries consciously or unconsciously gradually give up the initiative to develop towards higher value-added sectors along the global value chain, and lose the motivation to improve their ability to achieve the upgrading which will further enhance the external dependence, being locked to the low value-added sectors and thus entered a "Immiserizing Growth". How can developcountries get out of such dilemma?

2. POSSIBLE VALUE CHAIN CHOICES

2.1 National Value Chain

In GVC, under the pressure of big buyers of developed countries or multinational enterprise as dominant in the value chain, producers in developing countries are limited in low value-added and micro patent manufacturing segment in the value chain, which draws o lot of concerns from scholars at home and abroad.

Based on the practical experience, it's found that, enterprises in developing countries relying on the domestic market, and then entering the regional or global value chain shows a strong functional and chain upgrading ability. The first phase of the process above is known as NVC (National Value Chain). In NVC, producers in developing countries firstly focus on the development and competition in the domestic market so as to gain the competitive advantages in the upstream of one industry; such competitive advantages include their own design, brand and sales channels throughout the country. Producers and then gradually enter the neighboring countries or developing markets with similar demand, setting up regional value chain system (Area Value Chain, AVC) dominated by themselves. Finally entering the developed markets, producers build a fair relationship with big buyers or multinational companies, rather than capture type of relationship. There are also local companies in developing countries do not need to experience AVC the intermediate links, directly implying the NVC to GVC form.

2.2 The Comparison Between GVC and NVC

In the GVC built by multinational big buyers, these big buyers control the high point of ends of both technology and brand link in the value chain system, thus it's impossible for producers in developing countries to

upgrade in the high-end link, and nor can realize industry upgrading. Participating in NVC based on the domestic demand is of important practical significance. A platform for the core technique upgrading and independent brands foundation is built for the producers staying in the low-end in the GVC system, and helps achieve the chain upgrading. Besides, the circumstance that the domestic market is controlled by multinational big buyers, in turn, the industry development in developing countries is get suppressed, is changed. The table below shows the different situation the producers may face in GVC and NVC.

Table 1
The Different Situation the Producers May Face in GVC and NVC

	GVC	NVC
Source of demand	Multinational big buyers	Domestic demand
Feature of demand	Stability, and is conditioned by big buyers	Potential demand is big but need to develop and is uncertain
Production input	To maintain the relationship between big buyers becomes specific investment, and is a sunk cost	Cost of market development, channels entry and brand construction
Innovation behavior characteristics	Passive	Active
Enterprise upgrade mode	Limited in process upgrading and product upgrading	Functional upgrading and intersectional upgrading is possible with large cost and little experience
Source of upgrade ability	Technology trading/FDI	R&D/ reverse outsourcing/ acquisition/ recruiting talents

3. THE VALUE CHAIN STRATEGY MODEL

3.1 Model Construction

This paper set up a value chain strategy model for producers in developing countries to help making strategies in the value chain, using the same payment type of cobb-douglas production function to describe the enterprise production process.

$$Y = A(\lambda, t)K^{\alpha}L^{1-\alpha} \ .$$

Y stands for the gross production of the enterprise, A stands for the comprehensive technical level, K stands for the fixed capital stock, L stands for the total labor force. The production efficiency will not change along with the expansion of production scale; only when the technology level is improved, the economic benefit will be improved as well. Among them, A is a function composed of λ (R&D lambda) and t (time). Because of the non-linear relationship between A and λ, the function is defined as $A=(bt)^{\lambda}$. b is the science and technology level, $b>0$; the value of b differs in industries. λ is the R&D indicate of each industry.

Then, $Y = A(\lambda, t)K^{\alpha}L^{1-\alpha} = px, p = \dfrac{A(\lambda, t)K^{\alpha}L^{1-\alpha}}{x}$.

The price is p; the amount is x. The producer can decide whether the production would be sold export. x_g is the sales part in GVC, while x_n is the sales part in NVC, thus $x=x_g+x_n$. In GVC, part of the original goods can reach the destination, the rest part is spent on the way. If one unit of goods is supposed to be sold in GVC, τ unit of goods is needed; τ-*1* unit of goods would be spent on the way.p is the price in domestic market, p' is the price in the foreign market. To compensate for losses in the process of transportation, higher price is needed in the foreign market, namely, then $p'=\tau p$. τ is known as the iceberg transport cost. The profit function is shown as bellows:

$$\Pi = \tau p x_g + p x_n - \omega L - a_m(x_g + x_n) - \lambda \mathrm{GDP}$$

$$= \frac{(bt)^{\lambda}K^{\alpha}L^{1-\alpha}}{x_g + x_n}(\tau x_g + x_n) - \omega L - a_m(x_g + x_n) - \lambda \mathrm{GDP}$$

ω is the average wage of per worker, a_m is the variable input for each unit of goods to producer m (R&D contribution is not included). The higher a_m is, the higher value the goods contain. Production cost of the fixed and variable costs is not included in this function.

3.2 Model Analysis

3.2.1 Participate in NVC

In order to get the production under the maximization of profit, derivation is made upon NVC goods:

$$\frac{\partial \Pi}{\partial x_n} = \frac{(bt)^{\lambda}K^{\alpha}L^{1-\alpha}}{(x_g + x_n)^2}(\tau x_g - x_g) - a_m \ .$$

If the producer only participate in NVC, $x=x_n$, $\tau=1$, then $\dfrac{\partial \Pi}{\partial x_n} = -a_m < 0$. The marginal profit diminishes, so the producer will seek for the further development in the international market, thus the iceberg transport cost $\tau>1$.

3.2.2 Participate in GVC

In order to get the production under the maximization of profit, derivation is made upon GVC goods:

$$\frac{\partial \Pi^2}{\partial x_g{}^2} = -\frac{2(bt)^{\lambda}(x_g + x_n)(\tau x_n - x_n)K^{\alpha}L^{1-\alpha}}{(x_g + x_n)^4} \le 0 \ .$$

If the producer only participate in GVC, $x=x_g$, $\tau>1$, then $\dfrac{\partial \Pi}{\partial x_g} = -a_m < 0$. The marginal profit diminishes, and the speed is faster than it does in the NVC situation.

3.2.3 Participate in Both GVC and NVC

If participating in both GVC and NVC, the first derivative expression is unable to figure out the situation, the second derivative expression is needed:

$$\frac{\partial \Pi^2}{\partial x_g^{\ 2}} = -\frac{2(bt)^{\lambda}(x_g + x_n)(\tau x_n - x_n)K^{\alpha}L^{1-\alpha}}{(x_g + x_n)^4} \le 0 \ .$$

When participating in both GVC and NVC, the increase production in the global value chain does not lead to continuing increase in profits. After reaching the peak, the profit will fall although the share of GVC is still increasing.

The production in GVC under the max profit can be calculated:

$$x_g = \sqrt{\frac{(bt)^{\lambda}(\tau x_n - x_n)}{a_m} K^{\alpha}L^{1-\alpha}} - x \ .$$

Take x_g as function of x_n, we can get that:

$$\frac{\partial x_g}{\partial x_n} = \frac{1}{2}\sqrt{\frac{(bt)^{\lambda}(\tau - 1)}{a_m x_n} K^{\alpha}L^{1-\alpha}} - 1 ,$$

$$\frac{\partial x_g^{\ 2}}{\partial x_n^{\ 2}} = -\frac{1}{4}\sqrt{\frac{(bt)^{\lambda}(\tau - 1)}{a_m x_n} K^{\alpha}L^{1-\alpha}} < 0 \ .$$

Then when $x_g = x_n = \frac{(bt)^{\lambda}(\tau - 1)}{4a_m} K^{\alpha}L^{1-\alpha}$, the profit is max. While

$$(x_g + x_n)\ p = (bt)^{\lambda} K^{\alpha}L^{1-\alpha} = \frac{(bt)^{\lambda}(\tau - 1)}{2a_m} K^{\alpha}L^{1-\alpha} p \ ,$$

the equation $\frac{(\tau - 1)}{2a_m} p = 1$ can be get. The situation when iceberg transportation cost and product variable input meeting the equation can achieve the maximum profit. As the higher a_m is, the higher value the goods contain, a_m and p keep a positive relationship; thus all of the three variables keep a positive relationship.

Companies, therefore, when choosing for the strategy emerging GVC, the relationship between the value of the products and the iceberg transportation cost is supposed to be considered. For example, when producing goods with low value, target market with high transport costs and tariffs is not a good choice. NVC will be a good choice to get out of this dilemma.

3.3 Further Analyses

Most producers in developing countries are at the bottom of the value chain, with little or no research and development ability, and even do not have the ability to independently produce a single product. For these producers, they mainly get profit by selling component with little technology and low price. Under such circumstance, this paper assumes no scientific and technology investment in these producers, thus the profit function is as follows:

$$\Pi = \tau p x_g + p x_n - \omega L - a_m(x_g + x_n) = \frac{K^{\alpha}L^{1-\alpha}}{x_g + x_n}(\tau x_g + x_n) - \omega L - a_m(x_g + x_n) .$$

In order to get the wage condition under the maximization of profit, derivation is made upon labor force:

$$\frac{\partial \Pi}{\partial L} = (1-\alpha)\left(\frac{K}{L}\right)^{\alpha}\frac{\tau x_g + x_n}{x_g + x_n} - \omega \ .$$

If participating in both GVC and NVC, the first derivative expression is unable to figure out the situation, the second derivative expression is needed:

$$\frac{\partial \Pi^2}{\partial L^2} = -\alpha\ (1-\alpha)\frac{K^{\alpha-1}}{L^{\alpha}}\left(\frac{\tau x_g + x_n}{x_g + x_n}\right) < 0 .$$

Then when $L = K\left[\frac{(1-\alpha)\frac{\tau x_g + x_n}{x_g + x_n}}{\omega}\right]^{\frac{1}{\alpha}}$, the profit is max, and $\omega = (1-\alpha)\left(\frac{K}{L}\right)^{\alpha}\frac{\tau x_g + x_n}{x_g + x_n}$, taking the max profit into the equation, then $\omega = \frac{1}{2}(\tau + 1)(1-\alpha)\left(\frac{K}{L}\right)^{\alpha}$.

According to the above analyses, labor-intensive enterprises which producing light industrial products or components are supposed to choose the foreign market with high transport costs and tariffs, thus the main influence factors for wage condition are fixed capital stock and labor force. While in some developing countries, taking China for example, wage cost is getting higher and higher, such influence can be offset by cutting labor force or enlarging capital investment. Among all the strategies, more technology focus is the key point to achieve long-term development of the enterprise. Thus more focus on national value chain and technical investment is an alternative choice for producers in developing countries.

CONCLUSION

Countries need to carefully assess the pros and cons of GVC participation and the costs and benefits of proactive policies to promote GVCs or GVC-led development strategies. Promoting GVC participation implies targeting specific GVC segments and GVC participation can only form one part of a country's overall development strategy.

Before promoting GVC participation, policymakers should evaluate their countries' trade profiles and industrial capabilities in order to select strategic GVC development paths.

In GVC, under the pressure of big buyers of developed countries or multinational enterprise as dominant in the value chain, producers in developing countries are limited in low value-added and micro patent manufacturing segment in the value chain. NVC will be a good choice to get out of this dilemma. In NVC, producers in developing countries firstly would gain the competitive advantages in the upstream of one industry mostly based on the innovation in technology.

Either participating only in GVC or NVC will face marginal profit diminishing. Emerging in both NVC and GVC is a better choice for producers in developing country. Companies, when choosing the strategy for emerging GVC, the relationship between the value of the products and the iceberg transportation cost are supposed to be considered.

Most producers in developing countries at the bottom of the value chain are supposed to focus on national value chain and technical investment. Thus it's necessary for developing countries to build and improve the national value chain, which also needs the help from domestic producers at the top of the value chain.

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